

# Nova Notes



The Newsletter of the Halifax Centre of the Royal Astronomical Society of Canada

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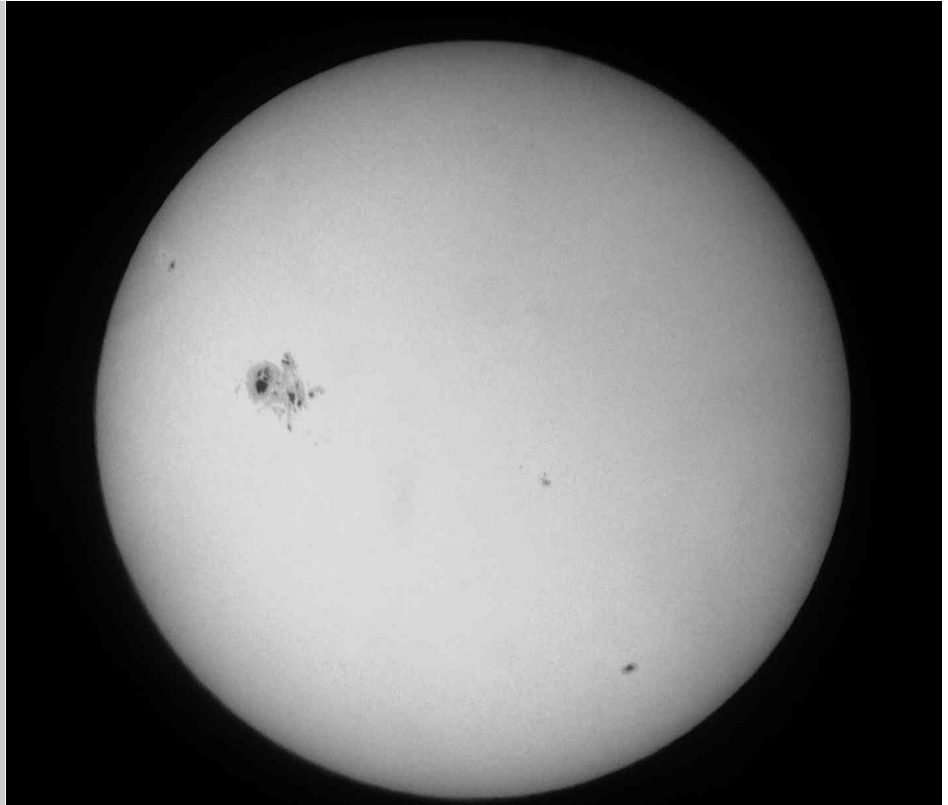
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Front Page Photo: Jeff Dalton

Sun taken on October 21st 2014

Jeff held his iPad at the eyepiece of his 8-inch dobsonian. Minimal processing was done on this photo.

Editor: I wanted to include this front page photo, just to demonstrate just how simple (some) astro-photography can be!



## From the editor

*Quinn Smith*

This will be my last edition of Nova Notes. After 7 years as editor, it is time to hand the reins of Nova Notes to a new Editor. I'm not going to tell you who the new Editor will be, because although someone has agreed to take over the role, we still have the possibility of an election for the position at our Annual General Meeting in December. I do, however, want to thank Dave Chapman, who has regularly proof read each edition of Nova Notes, and has considerably reduced the number of errors, misspelling and incorrect punctuation that have made it into print. After seven years I almost know where to put the apostrophe "s". It's quite easy when you get the hang of its rules.

Nova Notes has seen many changes over the years. Most members now receive the edition electronically, and with the advent of the e-mail list, Nova Notes has become more about archiving the Centre's activities, rather than being a "real time" purveyor of information. Having said that, what Nova Notes does very well is to expand on items that are brought up on the "list" or at meetings (the two featured articles in this edition are a perfect example).

So please support your new Editor, send in articles, pictures, equipment or book reviews, or any item that you think might be of interest to fellow members. Signing off for the last time—clear skies and a safe holiday to all!

## St. Croix Observatory

Part of your membership in the Halifax RASC includes access to our observatory, located in the community of St. Croix, NS. The site has grown over the last few years to include a roll-off roof observatory with electrical outlets, use of the Centre's new Go To 400-mm Dobsonian telescope and 100-mm binoculars, a warm-room, and washroom facilities.

Enjoy dark pristine skies far away from city lights, and the company of like minded observers searching out those faint "fuzzies" in the night. Observing nights (Fridays close to the New Moon) are open to both members and their guests. If you are not a key holder and would like to become one, or need more information, please contact the Observing Chairman, Alex LeCreux (for contact info, see below).

### Upcoming Observing Nights:

December 19th 2014  
 January 23rd 2015  
 February 14th 2015 (Saturday due to Friday meeting)

Meetings begin at 7:30 p.m. at Saint Mary's University in room AT 101.

### December 12th 2014 ( Note Date Change )

Our Annual General Meeting—terribly exciting! Help pick the new executive, and find out where the Centre is headed in the next year.

### January 16th 2015

Details and speakers have yet to be decided, but it will be more fun than a barrel of monkeys

### February 20th 2015

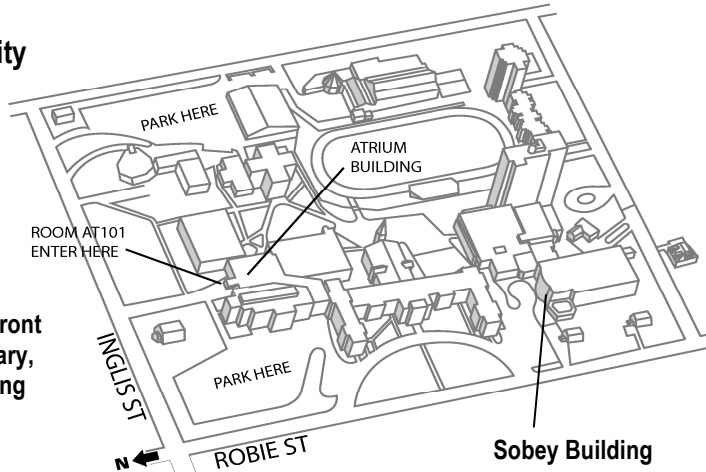
Details and speakers have yet to be decided. Can't you feel the anticipation?

All meeting location and contents subject to change

## Meeting Location: Saint Mary's University

### Atrium Building Room AT 101

The Atrium is located in front of the Patrick Power Library, between the Burke Building and Science Building.



Meetings are usually held on the third Friday of the month, except for the months of July and August, when there are no meetings.

Executive meetings begin at 6:30 p.m., usually in room AT 306, and all members are welcome.

The NOVA program (a beginner's guide to observing) will begin on October 17th at 6:30 p.m. in the main meeting room.

## Halifax RASC Executive, 2014:

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Councilor			



Each year the members of the Board of Directors, Committee Chairs, and Centre Representatives of the nation-wide RASC, meet during the General Assembly. This is usually the only time of the year when everyone involved in organizing, planning and running the RASC can get together and meet face to face.

The General Assembly (GA) is hosted by a different Centre each year, and the next GA is being hosted by the Halifax Centre at Saint Mary's University. This is not the first time that this Centre has hosted a GA, previously we hosted the event in 1993, 1980, and 1975. We are expecting between 100 and 150 RASC members from all across the country to attend our 2015 GA.

The GA consists of both working sessions (Advisory Council meetings and Board of Directors meetings) as well as tours, lectures and social events. The actual Annual General Meeting of the RASC will be held on Sunday morning. We also host a public lecture (the 2015 GA will feature the Ruth Northcott Lecture) which will be given by Professor Rob Thacker from Saint Mary's University. We will be featuring the GA agenda in future editions of Nova Notes, but the event always ends with the banquet—a chance to socialize, enjoy some great entertainment (a surprise!) and a wonderful

meal.

If you have never been to a GA, and are not familiar with the workings of the RASC, this is a wonderful opportunity to see how the RASC operates, and to participate in the decision making of the society. The greatest cost associated in attending a GA is the cost of getting to the GA and the cost of accommodation. For Halifax Centre members this should be minimal.

We will of course be looking for volunteers to help out at the GA. This will be an excellent opportunity to participate in what will be an interesting and fun event. Volunteers also get a 50% reduction in the cost of registering for the GA (registration allows participation in all events), a unique volunteer tee shirt, one heck of an after event party, and the satisfaction of participating in one the Centre major activities for the year. Volunteer details will be discussed on the Centre Web page, at meetings and in the pages of Nova Notes. It will be a fun event, I hope many of the members will join us in July 2015 at the RASC General Assembly.

*If you would like to find out more about the 2015GA, and/or how you can participate, please contact Quinn Smith at [quinnjem@yahoo.com](mailto:quinnjem@yahoo.com).*



**Nova Notes: The Newsletter of the Halifax Centre of the RASC**

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Nova Notes is published 5 times a year, in February, April, June/July, September/October, and December.

The deadline for the next edition is January 15th 2015

The opinions expressed herein are not necessarily those of the Halifax Centre.

Articles on any aspect of Astronomy and Allied Sciences will be considered for publication.



## Where the Sky Meets the Water and the Land

Dave Chapman

I am standing on the path in front of the Encampment in late summer, with the Mi'kmaw wigwam and fire circle behind me and the pebble beach before me, looking across the lake to the distant shore and gazing up at the Milky Way rising up among the bright stars. The lake is called Kejimkujik and the beach is called Merrymakedge, but I call this place "Where the Sky Meets the Water and the Land." I am not a religious man, but whenever I stand here I feel a kind of spirit—perhaps I experience this special place in the same way as its ancient inhabitants. From this spot, I see no evidence of modern life, and I imagine that I see Keji as others did hundreds or even thousands of years ago. That is, if I ignore the flashing lights and contrails of the transatlantic jets flying high overhead on their Great Circle routes between North America and Europe! Airplanes aside, the sky here is magnificent when dark and spectacular when the Moon is shining over the water.

Visitors to Kejimkijik National Park and National Historic

Site have long enjoyed hiking the trails and paddling the waters, and some of them have looked up now and again to take in the dark skies and the bright stars, but in fact there are precious few natural places in Keji where you can get a really GOOD look at the sky. I have been visiting and camping in Keji for a good 35 years, so I should know! Invariably, you must seek out a place where you can get near the shore of a lake or a river, away from a full canopy of trees, then you have some hope of looking over the water and seeing at least part of the sky in its glory. The easy places to access include Merrymakedge Beach, Kedge Beach, and the Eel Weir. Going further afield, there are more-remote sites from which to see the sky, including Backcountry Sites 14 and 15 (and probably others), and Peter Point (an easy hike from a gravel road).

There was one magical night at Peter's Point that I shared with a small group of friends, including astronomy friends and new Keji friends. We hiked out after sunset to view the inhabited part of the Park from across the lake, to see if there was any incidence of light spillage. We found some, a pop machine at the Merrymakedge Canteen (apparently, they didn't get the memo, and in any case there is no longer a canteen there). But that was not the magical part. We had been look-



*Observing at Merrymakedge Beach in Keji DSP*

*Photo: Peter McMahon*

ing north towards the campground from one side of the point as the sky got darker, and someone casually asked if we could see the constellation Scorpius. “Of course,” I said, and led the group a few metres across to the southern side of the point. When we looked up, we saw the Milky Way rising from the trees, through the constellations Scorpius and Sagittarius, and beyond. Even I, who was expecting the sight, was taken aback by the magnificence of the sky. There was a rock, inclined just at the right angle, warm from the Sun’s daytime heat. Some of us lay on it to take in the vista. It was August, the time of the Perseid meteor shower, and I thought we might see a few. Just then, as if on cue, a brilliant orange fireball streaked down the Milky Way and exploded before it reached the horizon. Anyone who was there that night will never forget it!

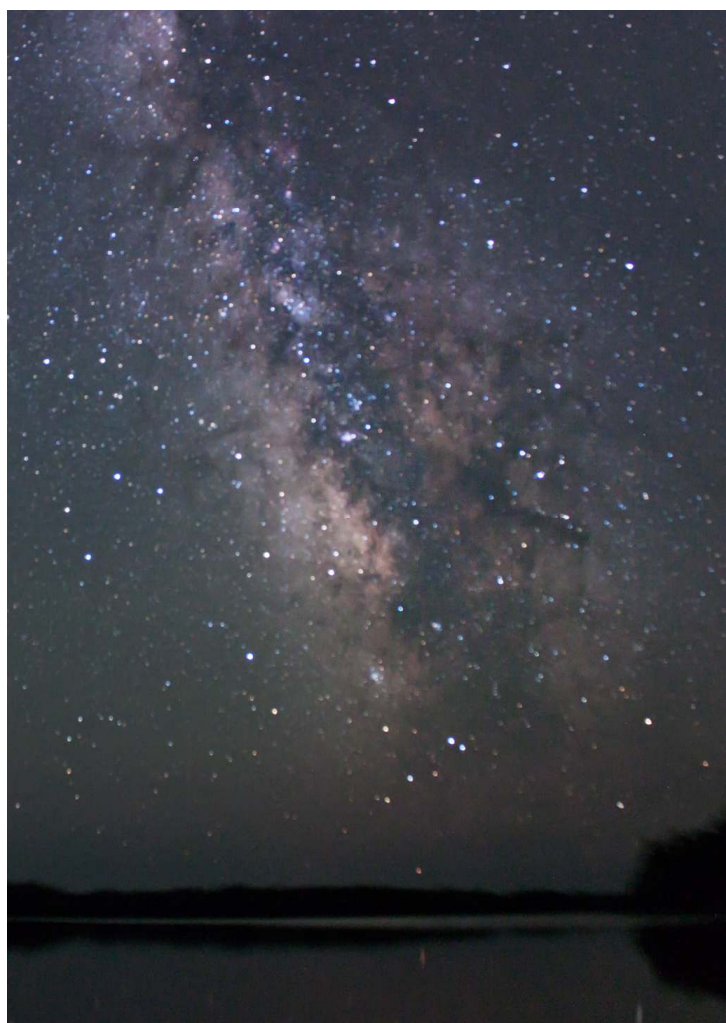
The tree-shrouded Jeremy’s Bay campsites are not good for sky-watching—in fact the masking of artificial campground light by the trees and vegetation make it possible to have a dark sky core that is truly dark; however, just a few minutes’ walk away from any campsite is the Sky Circle, a wooden deck with reclined benches situated in the open field behind P1, the overflow parking lot. From there, any visitor can get a pretty good view of most of the overhead sky any clear night. Park interpreters also use this spot for night-sky programs in summer and fall, often including the Park’s telescope.

Here is the story of the Sky Circle: In 2009, the Royal Astronomical Society of Canada-Halifax Centre approached Keji management with a proposal to create a Dark Sky Preserve: a place where RASC and Parks Canada could partner to promote responsible outdoor lighting practices, to educate the community and visitors, and to preserve the naturally dark skies. To cut a long story short, the RASC proposal was warmly welcomed, and preparations began immediately. By July 2010, all was in place and the DSP was declared! Night-sky programming was already underway, but participants were standing, squatting, and lying on the ground to observe the sky from the field behind P1.

In the meantime, ideas for an “outdoor planetarium” were circulating, and the RASC helped Keji conceive the concept of the Sky Circle, which Keji carried out superbly. In part, the concept derived from First Nations customs of sitting up at night and telling sky stories in talking circles. The Keji carpenter created a wide eight-sided raised wooden deck with a wheelchair-accessible ramp at the opening, with benches around the edge where up to 75 people can lean back and gaze at the sky. There is a gravel path that leads to it from P1, part-way illuminated with eye-friendly red lights. In the centre of the deck, there is a firm concrete pad upon which to set a telescope, isolated from the vibrations of the deck itself. The Sky Circle was ready for the 2011 season, and since then has been the focus of many night-sky gatherings, which continue to grow in popularity. I believe the Sky Circle is the keystone of the success of the Keji DSP, along with the com-

mitment of staff to deliver engaging programs from that location, based on a blend of First Nations sky lore, natural science, and ecology.

As I write this, five summers of night-sky programs have been presented since the establishment of the Keji DSP, some of which I have had a personal hand in, particularly the annual Dark Sky Weekend in August. As I write, I am preparing for one more event this season, to take place at the theatre and (if it is clear) at the Sky Circle. I am looking forward to those with great anticipation, but I may also sneak off and find a few moments to stand Where the Sky Meets the Water and the Land. There I will gaze across the lake to the low horizon of distant trees and follow the rise of the Spirit Road, which I have come to learn is the name that the Mi’kmaq gave to what I formerly knew as the Milky Way.



*A view of the southern sky from Peter Point, Keji  
(photo: Andrea Misner)*



## The Cosmos Underfoot

David Griffith

It has been suggested that the cosmos is not just above us, but also underfoot. Science spends billions sending orbiters and landers to study planets, moons, asteroids, and comets, yet meteorites regularly deliver samples from all of these free of charge. That's a pretty good deal for science! And since many specimens are retrieved by collectors who may or may not be associated with any particular scientific or government agency, a unique and widespread network of collectors has emerged, ranging from casual hobbyists like myself to business people, museums, scientists, and governments. Meteorites originate from planets, moons (including our own), asteroids and comets. We know this from studying this fallen material and comparing it to specimens retrieved from missions like Apollo as well as data collected from orbiters, landers and of course spectroscopic analysis by using earth and spaced-based telescopes. The great Chelyabinsk fall of 2013 reminded us of just how important it is to maintain a vigilant watch for these space visitors, for while they can be a boon to science, they also remind us of the fragility of our tiny, pale blue dot in space.

In many ways, meteorites help us understand the very origins of our solar system and our place in it. The study of their mineralogy and chemistry has aided in our understanding of planetary formation, their geologic history, atmospheres, and a great deal more. The most common and abundant class of meteorites, for example, the ordinary chondrites, are far from ordinary, containing structures called chondrules. These tiny 1-3 mm spherical inclusions were once liquid droplets of minerals that are thought to have formed in the early proto-planetary disc. The irregular calcium-aluminum inclusions in some of the most primitive meteorites, the carbonaceous chondrites, represent the earliest solid

material to form in that disc. When we look at a distant galaxy in our telescopes, we are awed by how old that light is. Imagine a similar sensation holding in your hand a rock that might be the oldest thing you can ever touch!



*A slice showing some large chondrules*

Meteorites fall under three main categories: stony, iron, and stony-iron. Most meteorites, including stony, contain metal, predominantly iron and nickel. The stony family are thought to originate from the crusts of their parent bodies, the irons from the cores, and the stony-irons from the core-mantle boundaries. Collectors often will build a collection around a more complex scheme based on the many sub-categories of stones based on their mineralogy, chemistry, and various internal and external structural features. The stony meteorites, for example, can be classed under chondrites and achondrites, and some of the latter are from Mars, and include 3 distinct sub-categories called Nakhilites, Chassignites and Shergottites. The latter group is now thought to have originated from the Mojave crater on Mars, the material blasted into space by (you guessed it) a meteorite!

Most collectors like to acquire some from all 3 main categories, as well as some or many sub-categories (and there are many!). In addition to acquiring specimens representing the main and sub-types, collectors might also look to include specimens that display some of the distinct features associated with certain meteorites. Irons often have a dimpled or "thumb-printed" surface; these regmaglypts are caused by the ablation or erosion of material from the surface of the stone as it heats up during its descent, and can result in an aesthetically pleasing sculpted appearance. A sub-category of the stony-irons, the pallasites, contain the mineral olivine. Slices of these meteorites are like celestial stained glass, with light shining through the translucent olivine crystals, their terrestrial equivalent of course being peridot.

Other features commonly sought by collectors include the dark fusion crust caused by the melting of the surface during descent, orientation or the "nose cone" appearance of meteorites than fell with minimal tumbling, flow



*An end cut showing the thin fusion crust of a stony meteorite*

lines and rollover lips caused by ablation, and various inclusions including the aforementioned chondrules, CAIs, and flecks of metal.

Location is another consideration for

the collector of these fascinating stones. Meteorites are typically analyzed by qualified labs, then named and catalogued (by the Meteoritical Society) according to where they fell or were found. A huge catalogue of meteorites exists from Northwest Africa (the NWA's), where many stones have been retrieved, since meteorites are easier to find in sparsely vegetated areas. They are also more likely to survive in relatively pristine condition longer due to the absence of water, since most stones contain iron, like the H4 chondrite group thought to have originated from the asteroid 6 Hebe. Desserts like the Atacama in Chile, the Sahara, Arizona, and Antarctica have yielded a huge catalogue of meteorites, not because more fall in deserts but because more can be found in deserts.

Some meteorite hunters do it for a living, selling their rare finds to individuals, museums and universities. Meteorites are the rarest things on earth, even more so than diamonds, and can be quite valuable, some of the rarer ones selling for hundreds of dollars per gram. Happily, for the casual collector, there are many specimens, both classified and unclassified, that can be acquired for a great deal less. Curiosity was my initial reason for collecting meteorites, but that has evolved somewhat. Now it is more for the stories they tell. What do they tell us about the solar system? The earth? Mars and our moon? Asteroids and comets? And what about humanity? How did ancient civilizations interpret these fireballs and their spawn? Then there are fascinating stories of modern collectors like pioneer meteorite hunter H.H. Nininger who ushered in the modern age of meteoritics. Modern television audiences might recall the reality show, *Meteorite Men*, a documentary series that chronicles the search for and retrieval of some well-known meteorite falls and finds. Perhaps most compelling however, are the stories of the meteorites themselves.

Chelyabinsk, one of the most significant modern day falls, second only to

the Tunguska event, not only deposited a wealth of collectibles and scientific specimens, but also reminded us of our fragility in space. It fell at about the same time a larger, known asteroid made a close fly-by. Similarly when we look at a piece of Canyon Diablo, the great iron that carved out Arizona's Meteor Crater, we see the destructive potential of meteorites. Consider ALH 84001, a Martian that some scientists argue contains fossilized microbes. Can meteorites seed life on planets? Then there is Almahata Sitta, the only asteroid ever to be discovered that was tracked during its orbit and also its fall, and recovered shortly thereafter for scientific study. It turned out to be a rare anomalous achondrite. Canada's own Tagish Lake fall delivered to our doorstep a fascinating carbonaceous chondrite containing amino acids and the highest known nanodiamond content in any meteorite.

It's not difficult to become a collector, even though your chances of actually discovering a new one or witnessing and collecting a fresh fall are probably similar to your chances of winning the lottery. If you do insist on having at least one stone in your collection that you actually found, consider some of the well-known strewn-fields in Arizona, perhaps a desert or dry lake bed. Arm yourself with a neodymium magnet too!



*Arizona's Barringer Crater*

There are numerous legitimate hunters/collectors/traders/sellers who will sell you everything from an inexpensive unclassified NWC to a big chunk



*A larger unclassified NWA fragment. Dime shown for scale.*

of Mars that you might have to remortgage your house for. Many of these vendors are members of a self-policing society called the International Meteorite Collectors Association (IMCA) and deal with museums and universities as well as each other. Their provenance is important to them. The Meteorite Exchange website ([www.meteorite.com](http://www.meteorite.com)) is an ideal place to start, a clearing house of numerous reputable online dealers and information. Also consider the Meteoritical Society, a scholarly non-profit organization that maintains the database of known classified meteorites. And don't forget our own Observer's Handbook, which of course has a section on meteorites. If you want a great read about meteorites, their stories and the people who hunt for them, there are many scholarly texts, but I would recommend the entertaining, informative and intensely personal *The Fallen Sky* by Christopher Cokinos. Purchase some storage units, perhaps a stereo microscope for viewing slices and fragments, and you are set to go. Who knows – perhaps the next time you spot an elusive asteroid during an observing session, you might be able to own and hold a piece of that small world. The cosmos, underfoot.



## October Meeting Report

Editor

Our President, Paul Heath, opened the meeting with one of his “Food for the Soul” poems titled “Wish upon a Star”.

The meeting was well attended with 45 people present, including 5 newcomers who were attending a meeting for the first time. After the usual introductions of the Executive, and outlining the advantages of RASC membership, Paul discussed the upcoming December Annual General Meeting.

Paul reminded all those present that each year the Executive comes up for renewal, and all positions are available to be voted on. If any member of the Centre is interested in running of an Executive position, or wished to nominate another member for a position, please contact any of the current Executive (see page 2).

Quinn Smith then spoke briefly about the upcoming 2015 RASC General Assembly which is being hosted by the Halifax Centre. The GA is held each year, and is hosted by a different Centre. The 2015 GA will be held at Saint Mary’s University between July 1st and 5th. This will be a major event which we hope will allow many members of the Centre to participate in various volunteer positions. There are more details on this event on page 3.

Quinn then offered solar filter material for sale. Quinn usually runs a solar filter workshop at Nova East, and occasionally offers this material at meetings. For those interested the cost is 50c per square inch and can be requested by contacting Quinn at [quinnjem@yahoo.com](mailto:quinnjem@yahoo.com)

Paul Heath then introduced our main speaker for the evening, David Griffith, whose talk was titled “They Came from Outer Space”. It was a fascinating talk about meteorites and meteorite collecting, with a great many examples

of the various types of meteorite that can be found. I won’t go into the details of David’s presentation, because he graciously contributed an article about this subject in this edition of Nova Notes (see page 6, “The Cosmos Underfoot”). There were many questions for David after the talk, and since he had brought many samples of his meteorite collection, we all had a chance to examine different types of meteor fragments.

Just as a point of interest. David explained the difference between meteoroid, meteor, and meteorite. It is called a meteoroid is when the object is travelling in space. When it enters the Earth’s atmosphere (a “shooting star”) it is called a meteor. If the object reaches the ground it is called a meteorite.

After David’s presentation Paul Gray and Nathan Gray gave us an account of their travel this summer, which included several observatories. Most of you will remember that Nathan became the youngest person to discover a supernova back in October 2013. He had just turned 10 years old (his older sister Kathryn had previously discovered her own supernova when she was also 10).

The meeting ended with Sean Dzafovic presenting the monthly “What’s Up”. Sean highlights astronomical objects that are well placed for viewing in the current month. He draws from the NOVA program (a beginner’s guide to observing) for the objects he discusses.

The meeting ended with snacks and cold drinks, with lots of discussions about meteor hunting, supernova discoveries and astronomy in general. A very pleasant evening and a good chance to catch up with friends that are often only seen at the Centre meetings.



Meeting presenter, David Griffith

### *“Wish upon A Star” - Paul Heath*

*Wish upon a falling Star  
In youth our dreams stretched so far.  
Yet a Quiet chuckle, just unheard  
Omen’s laughter . . . drifting down  
from darkened skies.*

*Glorious, bright Your sword, across the  
skies  
Yet hidden bread crumbs scatter, mystify,  
And falling Stars burst, as from a fire’s  
bed,  
Your laughter . . . so swift now above  
our heads.*

*And now Omen’s chuckle  
Lies scattered far upon the ground,  
Burnt rocks laid out to mystify.  
Or just pieces . . . broken from your  
Sword.*

*We’ve gathered up our Fallen Stars  
To seek, their measure, born of the  
past.  
Yet Omen’s laughter lingers on,  
For where, Oh where . . . have all the  
Dinos gone?*



## November Meeting Report

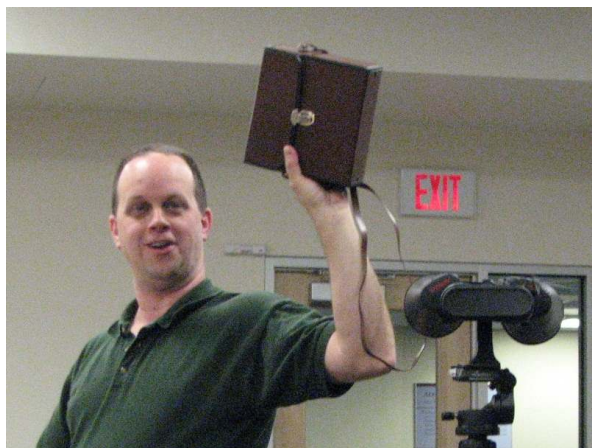
Ian Anderson

The meeting began at 7:30 with about 28 guests assembled on a brisk cold night. Five young people who were sitting on the east side of the room were non-member students of astrophysics or astronomy courses at either DAL or SMU. Unfortunately none of the guest packages were prepared and available.

Paul asked if anyone had brought a problem telescope with them but none had been brought. There were a couple in the crowd who said they nevertheless had questions about their scopes.

Paul Heath opened the meeting by talking about the usual prelude topics, including the benefits of membership, no the least of which was the calibre of expertise on the discussion forum on the internet. He then discussed the importance of the upcoming AGM in December and the need for nominations for many of the open executive positions, with no one coming forward to take over.

Mary Lou Whitehorne asked Paul to open the floor to nominations for the various positions as (Paul) had glossed over that step. MLW then nominated Paul Gray for President for 2015, sec-



*Paul Gray discussing binoculars, photo: Ian Anderson*

unded by Pat Kelly. Paul Gray accepted under the condition that he could nominate Jim Miller for Treasurer who in turn accepted. This nomination was seconded by MLW.

There was a quick mention of the 2015 RASC General Assembly by Pat Kelly, telling what the GA was about and what was involved preparing for it as a hosting Centre. He invited people to take an interest in it.

Paul Heath opened the telescope clinic by listing the crucial differences between the three main telescope designs, and how they worked, and what they were best suited for in terms of selecting a scope for one's favourite types of observing.

Paul Gray came up to talk about the benefits of binoculars of various sizes and capabilities. A lengthy expose on the joys of small and big binoculars with a lot of contributions from those in the audience who had done extensive binocular astronomy, and a fair list of tips to remember for ease of operation.

After Paul Gray's presentation, a member of the audience said he had an 11" Celestron SCT which had been left in its box for many years. He had been having seeking problems with the scope. The RA motor would not shut off and would cause the scope to circle several times. He was told it was likely his printed circuit card needed replacing.

Sean then came up for "What's Up" for the December sky. Venus, Mercury and Saturn will be lost in the Sun for the next month, with Mars setting earlier in the evening. Only Jupiter is well placed



*General view of the meeting - photo: Ian Anderson*

for some after midnight viewing. The Moon will interfere with evening deep sky observing until after full moon the first week in December. Sean picked out a few easy targets in the early winter sky like the Hyades in Taurus and some bright doubles.

The meeting ended quietly about ten minutes before nine with cookies and socialising.

### *Beaches of Time—Paul; Heath*

*We reach down, to touch that single grain of sand  
To hold upon our finger, and wonder whence it came.  
And sifting sand through fingers wide  
Gather in those finest grains  
To fire, like the Stars we seek,  
We form our mirror, Our mirror into time.  
We hew and forge and mold a frame  
To hold Time before our eyes.  
With hope we search, to find  
That flash of brightening light,  
That holds the hope of new formed grains.  
And wonder how when seen with awe,  
How long until new Beaches form,  
And who or what will walk those sands,  
And reach . . . to pick that single grain,  
To hold it high, and seek again those Beaches made of Time.*

## Cosmic Debris

### Odds and Sods from the world of astronomy and astrophysics

#### *Philae wins battle to send key data ahead battery depletion*

*November 14, 2014 by Chris Bergin  
Nasa Space Flight*

ESA's Philae lander battled against the odds on Friday, transmitting key scientific data before its batteries were depleted. Due to the unplanned location – following a couple of bounces on Comet 67P/Churyumov-Gerasimenko earlier this week – Philae was unable to draw the required power from its solar arrays, resulting in a battle against time to conduct its mission objectives.

Even if Philae never awakens from what could now be a permanent slumber, the mission has been a huge, historical success.

The ambitious mission involved ten years of transit since the Rosetta/Philae launch in 2004, culminating in the first ever soft landing on a comet.

There were a number of technical issues, which did not come as a major surprise, given the complex nature of the mission. However, none proved to be insurmountable per the mission goals.

Philae's stunning departure from Rosetta did go to plan. However, problems involving the cold gas thruster system that was to aid the lander's touchdown, along with the issue of the harpoons failing to fire to hold Philae in place, the spacecraft was unable to remain in the designated landing area.

Notably, Philae's initial touchdown was bang on target, touching down in the pre-selected landing site named Agilkia.

However, the lander bounced back up as far as a kilometer, before returning

to a new location on the comet, bouncing one more time, prior to then coming to rest on the surface.

Philae's eventual resting point saw it in a rather precarious position, with one leg in the air.

This raised concerns the lander would not be able to properly deploy its drill – a key element of the mission, with the goal of gathering samples from the comet, in turn potentially providing answers to questions as important as the origin of life on Earth.

It was then revealed that Philae's location was not ideal for its solar arrays, required to gain power from the Sun. The lander was shadowed by a cliff, a major issue – not helped by the fact the lander was not in its correct orientation, hindering the power collection of the arrays that are located around its body.

Despite the challenges, the little spacecraft and its team battled on via the creation of a plan to push through as many scientific goals as possible before Philae's battery power ran out.

That plan called for an incredibly busy Friday, first calling for Philae to drill into the surface of the comet, in order to gather samples, before sending the results as part of a data package during a short window of opportunity later in the day.

There was a risk that, due to Philae's position, the drilling could have failed or pushed the lander into an even worse position. The drilling was classed as successful.

However, Philae was running out of

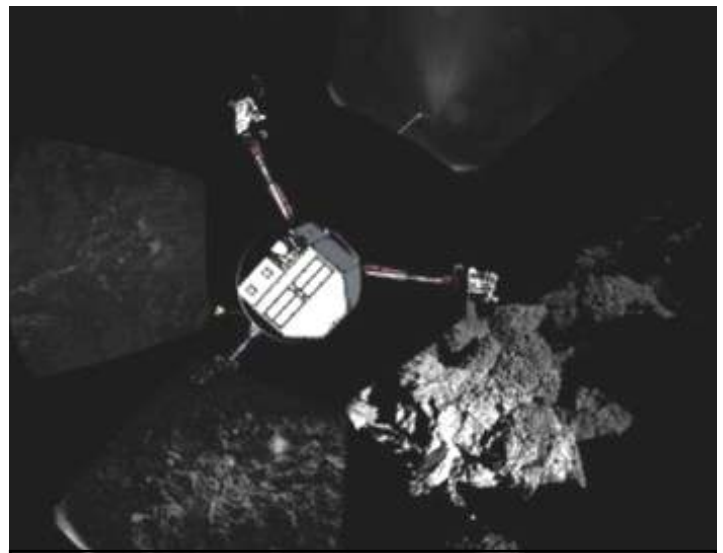
time, with battery power starting to diminish, and a key communication pass with Rosetta still to be conducted. There was a risk Philae's work would never have been received back on Earth if the communications between the two spacecraft did not return.

Thankfully, the Rosetta team were one step ahead of the situation, putting into place a plan for Philae to muster the strength to raise itself by just four centimeters, while rotating its body by 35 percent.

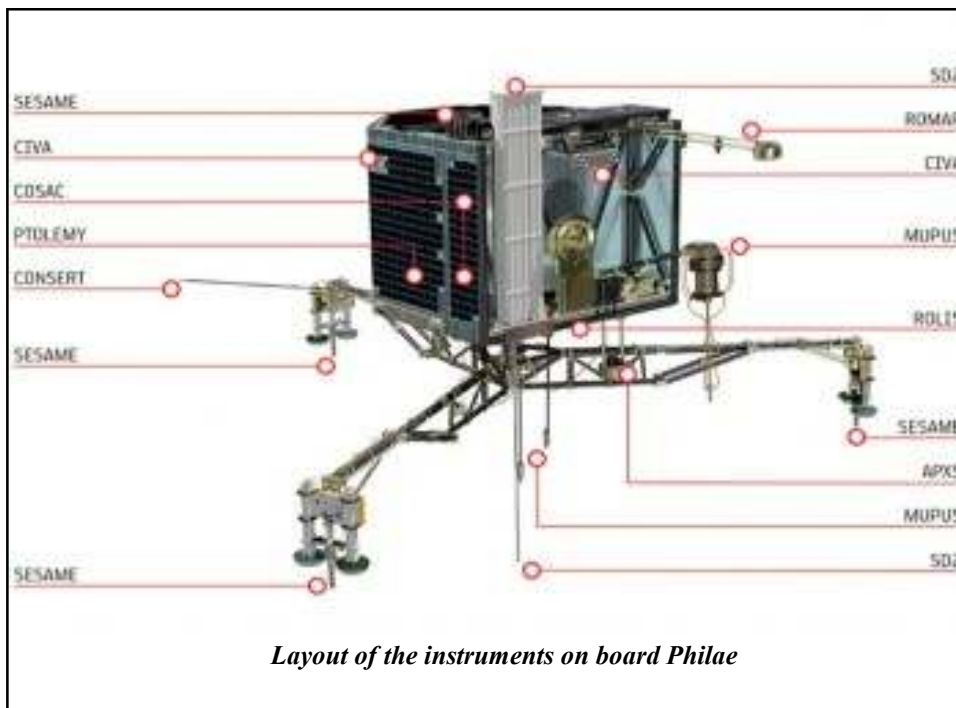
The goal was to provide just enough additional exposure of the solar arrays to sunlight, in order to give Philae a fighting chance of having enough power complete its tasks and be able to gain a communications link with Rosetta at the end of Friday.

"The rotation of the lander's body could result in more power if one of the larger solar panels can catch the illumination that is falling on the smaller," noted ESA's Mark McCaughrean, senior science advisor.

"All things being equal, the same amount of sunlight falling on a larger panel should result in more power being generated."



*Philae precariously perched on comet Comet 67P/  
Churyumov-Gerasimenko*



firmed as lost at 00:36 UTC, not long before the scheduled end of communications that would have happened when Rosetta orbited below the horizon.

Philae's future is now uncertain. The lander could get lucky if sufficient sunlight falls on the solar panels to generate enough power to wake it up.

The next possible communication slot to know if Philae had come back to life started at 10:00 UTC on Saturday when Rosetta passed overhead and listened for a signal. However, there was no communication received.

Future opportunities may arise as the comet closes in on its pass by the Sun. However, it is unknown how long Philae can survive in its current state.

Regardless of the eventual outcome, the Rosetta mission has already been a huge success, as scientists begin to pour over the large amounts of data that is now in their possession, all thanks to a brave little lander called Philae.

The plan worked.

Following a tense wait, communication was regained for the key transmission of data from Philae's work on the comet.

The results showed all of the science instruments were deployed, including the instruments that required mechanical movement, such as APXS, MUPUS, and the drill, SD2, that delivered samples to the PTOLEMY and COSAC instruments inside the lander.

"We've got data – all the house-keeping data and data from COSAC (The COmetary SAMpling and Composition experiment – used for detecting and identifying complex organic molecules)," flashed a report from Stephan Ulamec, Lander manager at Germany's DLR. "The drill (SD2) moved up and down, but we don't yet know what we have." Soon it was shown Philae was fighting against fading battery power, as expected. However, the intrepid lander showed true spirit and kept firing data at Rosetta, ahead of it being transmitted back to Earth.

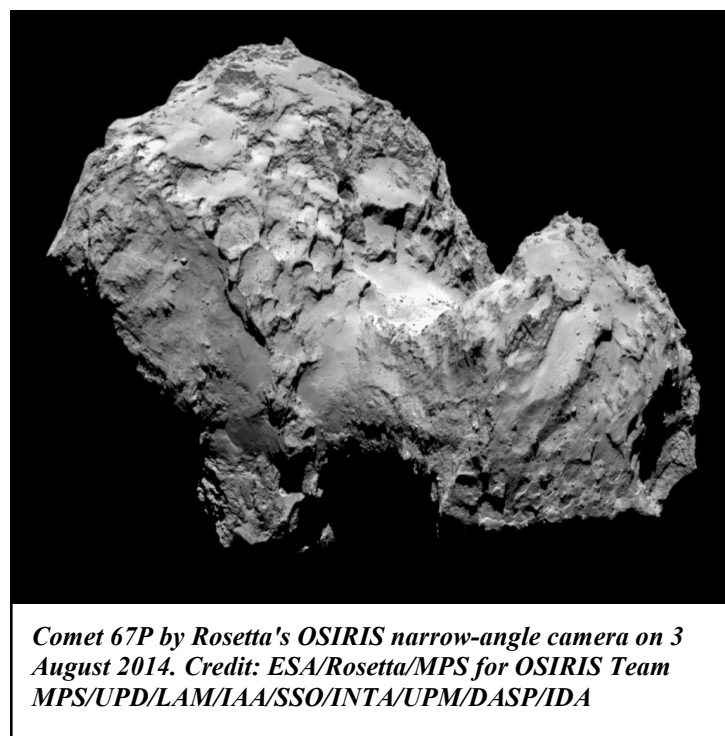
Eventually, Philae's batteries were

depleted, with not enough sunlight available to recharge. Philae fell into 'idle mode' – with all of its instruments and most systems on board shut down.

However, the lander's team were overjoyed with the data Philae managed to send before entering its slumber.

"Prior to falling silent, the lander was able to transmit all science data gathered during the First Science Sequence," added Mr. Ulamec. "This machine performed magnificently under tough conditions, and we can be fully proud of the incredible scientific success Philae has delivered."

Contact was con-





## Executive Duties

### Editor

Several members have expressed interest in the actual duties of the Executive of the Halifax Centre. We are a small Centre, and as such we apply the “all hands to the pump” approach to duties—that is, we all pitch in to do whatever needs to be done. However we do have specific responsibilities as described below. These are general (working) descriptions and should be considered as a guideline only

We have a couple of rules regarding the length of time a single person can hold an Executive position, for the President it is two consecutive years and for the Treasurer it is five consecutive years.

All positions are up for election at our Annual General Meeting held on December 12th 2014. We hope that all members will at least consider running for an Executive position at the AGM.

#### President:

- Recruit guest speakers
- Handle Centre inquires
- Book rooms for the exec and main meetings
- Run the Executive meetings and main meetings
- Collect reports and draft a monthly agenda for the exec meetings
- Support the group’s activities
- Serve on the nominating committee and recruit new executive members
- Annual Report is given to National

#### 1st VP:

- Actively support and assist the president.
- Run the exec and main meetings when the president is absent
- Recruiting volunteers for yearly events

#### 2nd VP:

- Publicity officer for events of Halifax and Astronomy Nova Scotia. Examples, Halifax RASC website, ANS website, Facebook, Twitter and the Coast.
- Coordinate outreach activities with other volunteers.
- Keep track of outreach equipment & materials.

#### Treasurer:

- Handle the finances of the centre
- Keep organized records
- Write cheques
- Write and present a report at the AGN

#### Secretary:

- Advise national of current executive and important events and events concerning members.
- Take the Executive minutes at the meetings
- Type up and distribute the minutes at the next exec meeting
- Take meeting Reports
- Submit a report for the AGM
- Coordinate with the Treasurer on submissions to the Registry of Joint Stocks
- Submit Minutes for the year to the Public Archives.

#### Nova Notes Editor:

- Collect articles and structure them within NN each Edition (there are currently five to six issues of NN each year)
- Email/Mailing out of NN
- Create information and welcome packages

#### SCO Manager:

- Maintain St. Croix Observatory (SCO) and organize work parties, if needed
- Support members night
- Maintain the inventory and equipment at SCO
- Handle the outgoing of keys to members

#### Observing Chair:

- Give a monthly “What's Up” talk
- Support RASC observing certificate programs (Explore the Universe, Messier Certificate, etc.)
- Organise the SCO Observing Nights
- Manage NOVA program

#### Librarian:

- Maintain the library
- Keep organized records on what books are presently in the library, who has signed out what and when.
- Purchase new material.

#### National Representative:

- Represent the Centre’s point of view at the nation-wide RASC Council
- Report on latest national RASC news

#### Councilors:

- Assist other members of the executive as required